

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-323346

(43)Date of publication of application : 26.11.1999

(51)Int.Cl. C10B 53/00  
C10B 53/02

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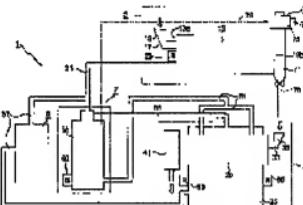
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## (54) CARBONIZATION PROCESSING UNIT OF WASTE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To decrease fuel consumption by structuring a drying part which reduces the moisture content of wastes by heating so that it functions as a flue of an exhaust gas generated from a carbonization part.

**SOLUTION:** A carbonization processing unit of wastes comprises: a drying part 3; a carbonization part 5 carbonizing by combustion of drying-treated wastes; an auxiliary burner 23 for drying to conduct heating at the drying part 3; an auxiliary burner 39 for carbonization to conduct heating at the carbonization part 5; and a heating-supplying part 7 for dry distillation gas to supply a dry-distilled gas generated from a carbonization room 29 in the carbonization part 5 into the drying part 3 and into the carbonization part 5 by heating. After the heated gas generated from the heating-supplying part 7 for dry distillation gas starts to be supplied to the drying part 3 at a desired temperature, running of an auxiliary burner 23 for drying is stopped. Further, after starting to supply the heated gas into the carbonization part 5 at a desired temperature, running of the auxiliary burner 39 for carbonization is stopped or altered to low combustion, and the unit comprises a structure in which the exhaust gas generated from the carbonization room 29 and a heating part 25 in the carbonization part is mixed with the heated gas generated from



the heating-supplying part 7 for dry distillation gas.

## \* NOTICES \*

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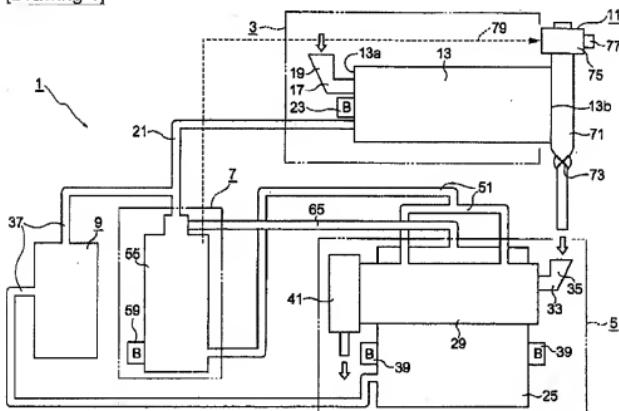
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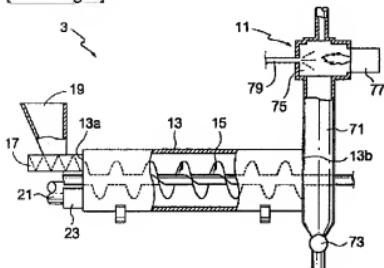
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## DRAWINGS

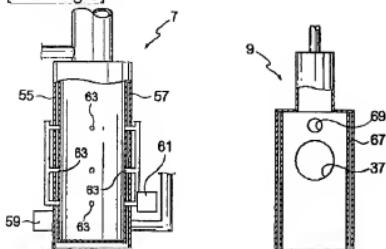
[Drawing 1]



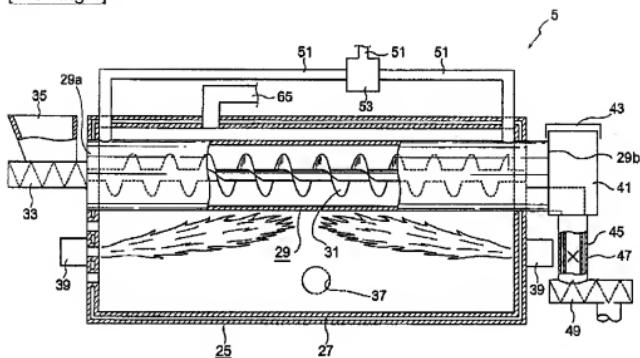
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

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#### DETAILED DESCRIPTION

## [Detailed Description of the Invention]

100011

[Field of the Invention] This invention relates to carbonization treatment apparatus, such as waste, and after it reduces the moisture content of waste with heating especially, it relates to carbonization treatment apparatus, such as waste which was made to perform carbonization treatment.

[0002]

[Description of the Prior Art] The various proposal of the processing system for using organic residue and other various wastes effectively today is made. The trial which carbonizes waste to one of them and is utilized for it as various kinds of resources, such as an object for agriculture and industrial use, occurs.

[0003]

[Problem(s) to be Solved by the Invention] However, most organic residue also in waste, for example, the saburra, paper sludge (sludge), etc. contain a lot of moisture, and since they become the water content of about 90% if paper sludge includes them, they need a huge heat calorie for carbonizing this. Therefore, the more the combustion gas containing not only consuming the fuel as a source of heating in large quantities but a toxic substance is emitted in large quantities, pollutes the atmosphere and tends to shorten processing time, in order to have to raise cooking temperature the more, there is a problem that immense cost starts the thermal protection system of a device.

[0004]In view of the above-mentioned conventional problem, it succeeds in this invention, and it is a thing.

The purpose is to provide carbonization treatment apparatus, such as waste which there is little fuel consumption and ends.

An object of this invention is to provide carbonization treatment apparatus, such as waste

which the thermal protection system of a device is easy, and end, or can process exhaust gas effectively using this thermal protection system.

[0005]

[Means for Solving the Problem]In order to attain this purpose, carbonization treatment apparatus, such as this invention waste, A dryer part to which water content is reduced by heating waste, and a carbonization section carbonized by burning waste which finished processing in this dryer part, An auxiliary burner for desiccation for performing heating by a dryer part, and an auxiliary burner for carbonization for performing heating by a carbonization section, Heat the dry distillation gas emitted from a coke oven chamber of a carbonization section, and it has said dryer part and a dry distillation gas heating feed zone supplied to a carbonization section, After heat gas which comes out of this dry distillation gas heating feed zone begins to be supplied to a dryer part at a desired temperature, operation of said auxiliary burner for desiccation is stopped, and after the above-mentioned heat gas begins to be supplied to a carbonization section at a desired temperature, operation of said auxiliary burner for carbonization is switched to a stop or low combustion.

[0006]Since a dryer part functions as \*\*\*\* of exhaust gas which comes out of a carbonization section if it is in a carbonization treatment apparatus of such composition, a source of heating in a dryer part can be dramatically managed with a small quantity, and exhaust gas which comes out of a dryer part, and exhaust gas which comes out of a carbonization section can be processed collectively. That is, in this carbonization apparatus, since the dry distillation gas emitted from a coke oven chamber of a carbonization section is heated, it is reusing as a source of heating in a dryer part and a carbonization section and this dry distillation gas is a remarkable elevated temperature, so much fuel consumption is not required to heat to a temperature required as a source of heating. Since it is exhausted with a steam and dust by which it is generated in a dryer part, this dry distillation gas can bundle up processing of exhaust gas, and can be performed. Therefore, since there is dramatically little fuel consumption taken to carbonize waste and it ends, a carbonized material as a result thing can be manufactured to cost \*\*, and a means for processing a detrimental constituent of exhaust gas can also be constituted in cost \*\*.

[0007]In carbonization treatment apparatus, such as waste indicated to claim 1, an invention of claim 2 mixes exhaust gas which comes out of a carbonization-cylinders heat chamber of a carbonization section to heat gas which comes out of a dry distillation gas heating feed zone. Therefore, it is recyclable in a source of heating in a dryer part, and a source of heating of the carbonization section itself, and also about processing of exhaust gas of this heat calorie for carbonization, it can bundle up with dry distillation gas etc. and a heating calorie in a carbonization section can also be processed.

[0008]In carbonization treatment apparatus, such as waste indicated to claim 1 or 2, an

invention of claim 3 establishes a heat exchange means which carries out temperature decrease by mixing with air heat gas which came out of a dry distillation gas heating feed zone, and is supplied to a carbonization-cylinders heat chamber. If it does in this way, it can prevent easily carrying out overheating damage of the carbonization section.

[0009]In either of the carbonization treatment apparatus, such as waste indicated to claims 1-3, an invention of claim 4 encloses a combustion chamber of a dry distillation gas heating feed zone with a water jacket, and. An emulsion purifying part along which exhaust gas which comes out of a dryer part passes is provided, and a scrubber means to inject a steam generated from said water jacket in this emulsion purifying part is formed. Therefore, since a steam required for a scrubber in emulsion purification can be provided with water as a heat-resistant means of a dry distillation gas heating feed zone, it can be constituted in the part and also cost \*\*.

[0010]

[Embodiment of the Invention]Below, the carbonization treatment apparatus 1, such as waste concerning an embodiment of the invention, are explained according to a drawing. The composition of this carbonization treatment apparatus 1 is divided roughly, the dryer part 3, the carbonization section 5, the carbonization gas heating feed zone 7, the heat exchange mechanism 9, and the emulsion purifying part 11 are comprised, and these each part is connected by flue piping.

[0011]There are no restrictions in particular in the treating raw material which can be processed with this carbonization treatment apparatus 1. For example, paper sludge which comes out from a paper mill, saburra which comes out from a food factory or an ordinary home. It is possible to process various wastes, such as the sludge of (for example, flesh of animals, fish meat, tofu lees, coffee, diaphragm dregs, other kitchen garbages, etc. of beer and an alcoholic beverage), livestock droppings, a river, or the sea, sawdust, tree waste, chaff, a rubber tire, and other various sorting waste plastics.

[0012]The dryer part 3 is heating agitating a treating raw material, and is a treating part to which the water content of a treating raw material is reduced. The details of this dryer part 3 are shown in drawing 2. 13 shows a rotary kiln, and the drum wall has a three-tiered structure which sandwiched thermal insulation, such as glass wool, by the griddle, and rotates at a comparatively late speed by the driving means which is not illustrated. The screw shaft 15 has penetrated in this rotary kiln 13, and this screw shaft 15 rotates comparatively by the driving means which is not illustrated at high speed.

[0013]17 shows the screw conveyor provided with the injecting hopper 19, and the tip is inserted in the entrance slot 13a of the rotary kiln 13. The treating raw material ridden and transported to the feed conveyor which is not illustrated falls from the injecting hopper 19 to the screw conveyor 17, and being moderately crushed by this screw conveyor 17, it is supplied to

the rotary kiln 13 and it goes.

[0014]21 shows the heat gas supply flue prolonged from the carbonization gas heating feed zone 7, and the tip is inserted in the entrance slot 13a of the rotary kiln 13. From this heat gas supply flue 21, \*\* ON of the abbreviated 400 \*\* heat gas is carried out to the rotary kiln 13.

[0015]23 shows the auxiliary burner for desiccation. The oil burner which uses a fuel oil and kerosene as fuel is used for this auxiliary burner 23 for desiccation, and it is arranged so that that burning flame may inject from the entrance slot 13a side to the rotary kiln 13. The thermo sensor which is not illustrated is formed near the tip of the above-mentioned heat gas supply flue 21, The auxiliary burner 23 for desiccation works until the temperature of the heat gas injected from this heat gas supply flue 21 amounts to 400 \*\*, and if having amounted to 400 \*\* is detected, combustion by the auxiliary burner 23 for desiccation will be suspended.

[0016]Therefore, the treating raw material fed into the rotary kiln 13, It moves being enough agitated by the rotational action of this rotary kiln 13 and the screw shaft 15, In the time of a start up, it is heated by the burning flame of the auxiliary burner 23 for desiccation, and after the temperature of the heat gas injected from the heat gas supply flue 21 amounts to 400 \*\*, it is heated by the heat gas injected from the heat gas supply flue 21, and moisture is evaporated with these heating. The baffle which is not illustrated is formed in the inner skin of the rotary kiln 13, and he is trying for time for a treating raw material to pass through the inside of the rotary kiln 13 to become as long as possible.

[0017]The carbonization section 5 is a treating part carbonized by \*\*\*\*\* (ing) the treating raw material which finished the processing in the dryer part 3, and shows drawing 4 the details. 25 shows a carbonization-cylinders heat chamber. This carbonization-cylinders heat chamber 25 is carrying out approximately box-like, and abbreviated [ of that wall / whole ] has overheating prevented by being covered with the water jacket 27. 29 shows carbonization cylinders. These carbonization cylinders 29 succeed in cylindrical shape, it is provided so that the inner top of the carbonization-cylinders heat chamber 25 may be penetrated horizontally, and that inside lets the screw shaft 31 pass. 33 shows the screw conveyor provided with the injecting hopper 35, and the tip is inserted in the entrance slot 29a which is a mouth by the side of the end of the carbonization cylinders 29.

[0018]By relay conveyor which is not illustrated, the treating raw material which came out of the rotary kiln 13 of the dryer part 3 is fed into the injecting hopper 35, and is supplied to the carbonization cylinders 29. Therefore, the treating raw material in the state where water content was decreased with heating by the dryer part 3 is thrown into the carbonization cylinders 29.

[0019]37 shows the flowing-back flue prolonged from the heat exchange mechanism 9, and the tip is connected to the carbonization-cylinders heat chamber 25. Abbreviated 500 \*\* heat gas is supplied to the carbonization-cylinders heat chamber 25 from this flowing-back flue 37.

39 shows the auxiliary burner for carbonization. An oil burner is used also for this auxiliary burner 39 for carbonization, and it is provided so that those with two right and left and its burning flame may inject in the carbonization-cylinders heat chamber 25. Combustion movement of the auxiliary burner 39 for these carbonization is performed by high combustion in the first stage, and after the temperature of the heat gas supplied from the flowing-back flue 37 amounts to 500 \*\*, it is changed to low combustion.

[0020]The treating raw material discharge cylinder 41 is formed in the outlet 29b of the carbonization cylinders 29, the damper 43 provided with the pressure regulating valve is formed in the upper bed part of this treating raw material discharge cylinder 41, and the pressure in the carbonization cylinders 29 is held by this damper 43 approximately regulated. The cooling conveyor 47 provided with the water jacket 45 is connected to the treating raw material discharge cylinder 41, while passing along this cooling conveyor 47, it is cooled, and the treating raw material which comes out from the outlet 29b of the carbonization cylinders 29, i.e., the raw material in the state where it was carbonized, is transported to the discharging conveyor 49.

[0021]The carbonization gas flue 51 is prolonged near entrance slot 29a of the carbonization cylinders 29, and from near outlet 29b, and these two carbonization gas flues 51 are connected to the carbonization gas heating feed zone 7 through the manifold 53.

[0022]The dry distillation gas heating feed zone 7 heats the dry distillation gas emitted within the carbonization cylinders 29, are the dryer part 3 and a treating part supplied to the carbonization-cylinders heat chamber 25, and shows drawing 3 the structure. 55 shows a carbonization gas heat chamber. This carbonization gas heat chamber 55 is carrying out the longwise cylindrical shape, that whole wall is covered with the water jacket 57, and the tip of said carbonization gas flue 51 is connected to the lower end part. 59 shows the dry distillation gas heating burner formed in the lower end part of the dry distillation gas heat chamber 55, and the carbonization gas emitted within the carbonization cylinders 29 is supplied to this dry distillation gas heat chamber 55, is heated with the dry distillation gas heating burner 59, and is left at abbreviated 900 \*\* temperature from this dry distillation gas heat chamber 55.

[0023]61 shows an air blasting machine and the airstream sent from this air blasting machine 61 is injected from the air injection hole 63 of a large number arranged by the wall of the flowing-back gas heat chamber 55 in the shape of an approximately spiral. Cooking time is gained by the burning flame in the dry distillation gas heat chamber 55 going up circling spirally, and circling in this way by this blast air style. The heat gas which the above mentioned heat gas supply flue 21 is prolonged from the upper bed exit of the dry distillation gas heat chamber 55, and is supplied to the rotary kiln 13 of said dryer part 3, It is things, such as heated dry distillation gas, and it becomes the temperature of about 400 \*\* and the rotary kiln 13 is supplied by the heat loss [ it passes along the heat gas supply flue 21 ] of a between.

[0024]The combustion gas flue 65 is prolonged from the top panel wall in the carbonization-cylinders heat chamber 25, and the tip of this combustion gas flue 65 is connected to the base end of the heat gas supply flue 21. Therefore, it is mixed with the heated dry distillation gas, and the combustion gas which comes out of the carbonization-cylinders heat chamber 25 is supplied, and goes. That is, the heat used for heating of the carbonization cylinders 29 is also reused by desiccation by the dryer part 3, etc.

[0025]From the heat gas supply flue 21, the flowing-back flue 37 branches and the heat exchange mechanism 9 is inserted in this flowing-back flue 37. As the heat exchange mechanism 9 is shown in drawing 3, the wall is covered with the water jacket 67, and the fresh air intake 69 is formed. Temperature decrease of the abbreviated 900 \*\* heat gas shunted from the heat gas supply flue 21 is carried out to about 500 \*\* because the open air dilutes with this heat exchange mechanism 9, and it is supplied to the carbonization-cylinders heat chamber 25. Therefore, as for the heat gas which comes out of the carbonization gas heating feed zone 7, and the combustion gas which comes out of the carbonization-cylinders heat chamber 25, the part is used as a source of heating in the dryer part 3, and also the complementary is used as a source of heating for carbonization-cylinders 29.

[0026]Although the temperature of 500 \*\* of the heat gas supplied to the carbonization-cylinders heat chamber 25 is not an especially high temperature, since the drying process of the treating raw material thrown into the carbonization cylinders 29 is carried out in the dryer part 3, it is sufficient heat calorie to carbonize the treating raw material which this dryness is following. Since the heat gas supplied to the carbonization-cylinders heat chamber 25 is a temperature of this level, the thermal protection system of the carbonization-cylinders heat chamber 25 is dramatically simple, and ends.

[0027]71 shows the discharge cylinder provided in the outlet 13b of the rotary kiln 13, and the discharge rotary feeder 73 is formed in the lower end part. The treating raw material which has moved in the inside of the rotary kiln 13 rides on the relay conveyor which is not illustrated after falling from the outlet 13b to the discharge rotary feeder 73, is fed into said injecting hopper 35 of the carbonization section 5, and goes.

[0028]The emulsion purifying part 11 the steam and dust generated from the burning flame of the exhaust gas 23 discharged from the rotary kiln 13, i.e., the auxiliary burner for desiccation, the heat gas from the carbonization gas heating feed zone 7, and a treating raw material under highly humid, It is a purifying treatment part for carrying out reduction in damage, deodorization, temperature decrease, etc., and the reaction chamber 75 where the upper bed part of the discharge cylinder 71 was connected, and this reaction chamber 75 are equipped with the oil burner 77 grade which injects a burning flame.

[0029]79 shows a scrubber steam pipe. This scrubber steam pipe 79 is prolonged from the water jacket 57 of the dry distillation gas heating feed zone 7, that tip is connected to the

reaction chamber 75, and a part of high-pressure steam generated with the water jacket 57 is injected by the burning flame of the above-mentioned oil burner 77 in the reaction chamber 75. The carbonization treatment apparatus 1, such as waste, are constituted as mentioned above. [0030]Next, the operation by this carbonization treatment apparatus 1 is explained. As described above, while passing this rotary kiln 13, stoving of the treating raw material fed into the rotary kiln 13 is carried out. It is performed by only this heat gas, after this heating is performed by the burning flame of the auxiliary burner 23 for desiccation in the time of a start up and abbreviated 400 \*\* heat gas comes to be supplied from the heat gas supply flue 21. Although time until 400 \*\* heat gas comes to be supplied from the heat gas supply flue 21 after a start up is not necessarily fixed, in order to come to supply the heat gas of this temperature, The process in which the treating raw material fed into the rotary kiln 13 finishes processing here, and it is supplied to the carbonization cylinders 29, burn, the dry distillation gas emitted here is heated by the dry distillation gas heat chamber 55, and the rotary kiln 13 is supplied is required, and about 1 hour is taken to pass through this process.

[0031]The burning flame of the auxiliary burner 23 for desiccation and the abbreviated 400 \*\* heat gas supplied to the rotary kiln 13 are exchanged for the moisture evaporation latent heat of a treating raw material within the rotary kiln 13, and temperature decrease is carried out to abbreviated 70 \*\* exhaust gas, and it comes out from the rotary kiln 13. This exhaust gas reaches the reaction chamber 75 through the discharge cylinder 71, and exhaust gas is exposed to the steam injected from the scrubber steam pipe 79, will be in the state of dispersing and stagnating in a steam, and will burn with the burning flame of the oil burner 77 here. Thereby, toxic substances, such as carbon dioxide in exhaust gas, hydrogen chloride, and nitrogen oxides, are changed into a harmless substance (quality of a weak acidic ghost).

[0032]Since the carbonization gas emitted in the carbonization cylinders 29 besides being a steam, dust, etc. generated from the burning flame of the auxiliary burner 23 for desiccation and a treating raw material and the burning flame of the dry distillation gas heating burner 59 are also contained in the exhaust gas purified in this way, they are collectively processed by these. If it puts in another way, the rotary kiln 13 will function also as a flue of the exhaust gas which comes out of the carbonization section 5.

[0033]With the rotary kiln 13, the treating raw material which had water content reduced is thrown into the carbonization cylinders 29, carries out heating combustion here and carbonizes. As described above, after heating of the carbonization cylinders 29 is performed by the burning flame of the auxiliary burner 39 for carbonization in the beginning and about 500 \*\* heat gas comes to be supplied from the flowing-back flue 37, combustion of the auxiliary burner 39 for carbonization is changed to low combustion. Therefore, the inside of the auxiliary burner 23 for desiccation, the auxiliary burner 39 for carbonization, and the dry distillation gas heating burner 59, It becomes only the dry distillation gas heating burner 59 that

combustion is behind suspended after a start up for about 1 hour, the auxiliary burner 39 for carbonization changes to low combustion after about 500 \*\* heat gas begins to be supplied from the flowing-back flue 37, and the auxiliary burner 23 for desiccation maintains high combustion to the last.

[0034]As mentioned above, although the embodiment of the invention has been explained in full detail, concrete composition is not restricted to this embodiment, and even if there are change etc. of the design in the range which does not deviate from the gist of this invention, it is included in this invention. For example, in an embodiment, although it was made to perform delivery of the treating raw material within carbonization cylinders only by rotation of a screw shaft, this delivery is a rotational action of carbonization cylinders, or it may be made to perform it in both operations of rotation of carbonization cylinders, and rotation of a screw shaft. In the embodiment, after the heat gas of a necessary temperature began to be supplied to a carbonization-cylinders part from a dry distillation gas heating feed zone, switched the auxiliary burner for carbonization to low combustion, but. It may be made to stop combustion of this auxiliary burner for carbonization depending on the water content of a treating raw material, and burning intermittently is also considered.

[0035]

[Effect of the Invention]As mentioned above, since a dryer part functions as \*\*\*\* of the exhaust gas which comes out of a carbonization section if it is in carbonization treatment apparatus, such as this invention waste, the source of heating in a dryer part can be dramatically managed with a small quantity, and the exhaust gas which comes out of a dryer part, and the exhaust gas which comes out of a carbonization section can be processed collectively. That is, in this carbonization apparatus, since the dry distillation gas emitted from the coke oven chamber of a carbonization section is heated, it is reusing as a source of heating in a dryer part and a carbonization section and this dry distillation gas is a remarkable elevated temperature, so much fuel consumption is not required to heat to a temperature required as a source of heating. Since it is exhausted with the steam and dust by which it is generated in a dryer part, this dry distillation gas can bundle up processing of exhaust gas, and can be performed. Therefore, since there is dramatically little fuel consumption taken to carbonize waste and it ends, the carbonized material as a result thing can be manufactured to cost \*\*, and the means for processing the detrimental constituent of exhaust gas can also be constituted in cost \*\*.

[0036]According to the invention of claim 2, it is recyclable in the source of heating in a dryer part, and the source of heating of the carbonization section itself, and also about processing of the exhaust gas of this heat calorie for carbonization, it can bundle up with dry distillation gas etc. and the heating calorie in a carbonization section can also be processed.

[0037]According to the invention of claim 3, it can prevent easily carrying out overheating

damage of the carbonization section.

[0038]According to the invention of claim 4, since a steam required for the scrubber in emulsion purification can be provided with the water as a heat-resistant means of a dry distillation gas heating feed zone, it can be constituted in the part and also cost \*\*.

[Translation done.]